In the Claims

Cancel claims 1-38.

Add new claims 39-76, as follows:

39. A single crystal article, consisting essentially of a single crystal material selected from the group consisting of GaN, InN, AlN, AlGaN, InGaN, AlInN, AlInGaN, SiC, and SiC alloys of GaN, InN, AlN, AlGaN, InGaN, AlInN, and AlInGaN, optionally n-, p- or semi-insulatively doped, said article having a three dimensional (x,y,z) character wherein each of the dimensions x, y and z is at least 100 micrometers, and said single crystal material no defects from thermal coefficient of expansion differences.

40. A single crystal GaN article, consisting essentially of a single crystal GaN material, optionally n-, p- or semi-insulatively doped, and having a three dimensional (x,y,z) character wherein each of the dimensions x, and y is at least 100 micrometers and z is at least 1 micrometer, wherein the single crystal GaN material has no defects from thermal coefficient of expansion differences.

41. A single crystal GaN article of cylindrical or disc-shaped form wherein the diameter is at least 200 micrometers and the thickness is at least 1 micrometer, wherein the single crystal GaN material has no defects from thermal coefficient of expansion differences.

42. A single crystal GaN article of cylindrical or disc-shaped form, having a thickness of at least 100 micrometers and a diameter of at least 2.5 centimeters, wherein the single crystal GaN material has no defects from thermal coefficient of expansion differences.

43. A single crystal article according to claim 39, wherein the bulk single crystal comprises a surface having a microelectronic device structure or substructure formed thereon.

44. A single crystal article according to claim 39, comprising a doped surface region.

45. A single crystal article according to claim 44, wherein the doped surface region silicon-doped.

46. A single crystal article according to claim 45, wherein the silicon-doped surface region has an ohmic contact structure fabricated thereon.

47. A single crystal article according to claim 39, where the single crystal material comprises a compositionally graded ternary metal nitride selected from the group consisting of AlGaN, InGaN, and AlInN.

48. A single crystal article according to claim 39, wherein the single crystal material is doped with a dopant selected from the group consisting of Si, Ge, S, Se, Mg, Zn, Be, V, and Fe.

49. A single crystal article according to claim 39, wherein the single crystal material is n-doped.

50. A single crystal article according to claim 39, wherein the single crystal material is p-doped.

51. A single crystal article according to claim 39, wherein the single crystal material is semi-insulatively-doped.

52. A single crystal material selected from the group consisting of GaN, InN, AlN, AlGaN, InGaN, AlInN, AlInGaN, SiC, and SiC alloys of GaN, InN, AlN, AlGaN, InGaN, AlInN, and AlInGaN, optionally n-, p- or semi-insulatively doped, produced by a process of growing the bulk single crystal material heteroepitaxially on a sacrificial base and removing the sacrificial base while the bulk single crystal material is close to the growth temperature of the material.

53. A single crystal material according to claim 52, comprising GaN.

54. A single crystal material according to claim 52, comprising a AlGaN.

55. A single crystal material according to claim 52, comprising a InGaN.

56. A single crystal material according to claim 52, having a three dimensional character wherein each of said dimensions is at least 100 micrometers.

57. A single crystal material selected from the group consisting of GaN, InN, AlN, AlGaN, InGaN, AlInN, AlInGaN, SiC, and SiC alloys of GaN, InN, AlN, AlGaN, InGaN, AlInN, and AlInGaN, optionally n-, p- or semi-insulatively doped, produced by a process of growing the bulk single crystal material heteroepitaxially on a sacrificial base and removing the sacrificial base while the bulk single crystal material is at elevated temperature by fracturing the substrate from the bulk single crystal material via pressure deriving from an implanted species.

58. A single crystal material according to claim 57, wherein said implanted species comprises hydrogen.

59. A single crystal material according to claim 57, having a three dimensional character wherein each of said dimensions is at least 100 micrometers.

60. A single crystal GaN article having a diameter greater than 10 inches, wherein the bulk single crystal GaN material has no defects from thermal coefficient of expansion differences.

61. A method of making a single crystal GaN substrate, comprising growing GaN over a substrate heterogeneous to GaN, and removing the heterogeneous substrate to yield the single crystal GaN substrate.

62. A single crystal GaN substrate, formed by the method of claim 61.

63. A method of making a single crystal GaN substrate, including the steps of:

providing a substrate heterogeneous to GaN, having one or more intermediate layers thereon;

growing a layer of GaN over said one or more intermediate layers to form an article including the heterogeneous substrate, one or more intermediate layers, and layer of GaN; and

removing the heterogeneous substrate from the article.

64. The method of claim 63, wherein the one or more intermediate layers includes a buffer layer.

65. The method of claim 63, wherein the one or more intermediate layers includes a template layer for subsequent GaN growth thereon.

66. The method of claim 63, wherein the one or more intermediate layers includes a protective layer.

67. The method of claim 63, wherein the one or more intermediate layers includes an etch stop layer.

68. A single crystal GaN substrate for fabrication of a microelectronic device structure, said substrate having a thickness of at least 100 micrometers, and a diameter of at least 2.5 centimeters, and being free of defects caused by thermal coefficient of expansion differences.

69. A single crystal GaN substrate, grown on a substrate heterogeneous to GaN from which the single crystal GaN substrate has been obtained by removing the heterogeneous substrate therefrom prior to cooling the single crystal GaN substrate by more than 300°C from its growth temperature.

70. A method of forming a GaN single crystal substrate, comprising:

growing GaN on a gallium arsenide substrate; and

etching the gallium arsenide substrate to remove same and yield the GaN single crystal substrate.

71. The method of claim 70, wherein the gallium arsenide substrate is etched away *in situ* at a temperature within 300°C of the growth temperature of the GaN on the gallium arsenide substrate.